

25X1

**NINTH MONTHLY LETTER REPORT ON  
IMAGE ENHANCEMENT (U)**

**(1 May 1967 to 31 May 1967)**

25X1

**Task Order No. 18**

**14 June 1967**

25X1

Although we expected delivery of twenty optical transmission masks nearly three weeks ago, the precision and uniformity required in the masks was not fully appreciated by the contractor. It was necessary for us to fabricate a new set of impulse responses with slightly different dimensional scales to make the metal etching technique feasible. We expect to begin work with these masks this week.

Alternative techniques have been investigated to simulate accurately an aberrated impulse response but other contractors who have indicated they have the ability to fabricate transmission masks with the desired characteristics all use essentially the same basic photoetching process and admit our specifications are near state of the art.

In the interim we have continued experimentation with one dimensional smears. In the seventh monthly progress letter we demonstrated the ability of an inverse-hologram filter to recover a high quality line from a simulated smear of that line. These results were obtained by using the novel single element filter which contained the product of  $\frac{1}{|\tau(\mu)|^2}$  and  $|1 + \tau(\mu)|^2$  where  $\tau(\mu)$  is the transfer function associated with the impulse response of the motion aberrated image. In this reporting period more conventional two element filters were constructed for comparison purposes. In terms of resolution and energy transfer to the restored image the single element filter technique is noticeably superior. In the absence of a careful comparison of two optimum systems, a more quantitative statement would not be meaningful.

Although the experiments with the one dimensional slit have been very encouraging, corrections of smeared photographs have been plagued with spotty illumination and a high noise background. Much of these artifacts are caused by the coherent optical

- 2 -

system but we are now completing an experimental evaluation of film types and exposures to minimize sources of noise in the storage media. In the coming month we plan to use the data resulting from this study in the experiments to correct the effects of multi-dimensional image motion using the specially fabricated transmission masks mentioned above.

As of the week ending 3 June 1967, 77% of the contract time has been utilized. Of the amount funded 68% of the total cost has been expended. It is estimated that 75% of the work effort is completed with the remainder of the contract being devoted to obtaining demonstrable imagery and analysis of the approximations taken.